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HAS THE STUDY OF ORGANIC CHEMISTRY A PRACTICAL VALUE FOR PHARMACISTS?

Introductory lecture of the course of 1879–80 in the Philadelphia College of Pharmacy, delivered October 1st, 1879, by SAMUEL P. SADTLER, Ph. D., Professor of Chemistry.

A branch of study like chemistry, we will find upon examination of its history, must pass through several stages of progress before it reaches that precision of methods which entitles it to rank among the exact sciences.

As chemistry treats of the essential nature and composition of matter, its study began very early in the history of the world's progress. Coming down to us from the ancient Egyptians through the hands of the alchemists and physicians of the middle ages, we find that already in the last century it consisted of a vast number of facts and isolated observations upon mineral and vegetable substances. These observations had been made by all kinds of men, and possessed, of course, very varying value, erroneous and defective results being very closely interwoven with others of lasting value. The science stood then upon foundations shifting and uncertain. This may be said to have been the first stage in its progress. With the beginning of this century, however, the introduction of the analytical balance by Lavoisier and the determination of the atomic weights of most of the elements by Berzelius paved the way for more exact working, and observations had to be submitted to sharp analytical tests before being considered worthy of record. The rapid development of these analytical methods and their application to the study of minerals and drugs soon gave to mineral or inorganic chemistry, at least, a firm foundation. While the science was still purely an empirical one, it had now acquired more claim to be ranked as an exact one. This may be called the second stage in the progress of chemistry. Our knowledge of inorganic chemistry indeed might have been brought to a very high pitch merely by advancing

these analytical methods nearer to perfection, and chemistry might have remained an empirical science.

There was, however, another branch of the subject that, undeveloped as yet, required different methods before its study could be made to yield any adequate reward. The application of the simple analytical methods to vegetable and animal substances tells us little of their real character. We find carbon and hydrogen together with oxygen, and perhaps nitrogen, and that is all. Two substances utterly unlike in physical and physiological characters may show on analysis exactly the same percentage composition, and we have no clue as to what constitutes the difference. Other methods have obviously to be used.

If, instead of determining the elemental composition of an organic compound, we endeavor to decompose it gradually by the application of different reagents, or in other words, to effect its proximate analysis, we get results of far greater value. Differences which may serve as a basis of classification soon show themselves, and hydrocarbons, alcohols and acids range themselves in groups as the result of such treatment. But there is yet another and perhaps a greater possibility in the case of organic compounds. If we can take them apart gradually, by piece meal as it were, can we not build them up step by step? This process, called synthesis, as distinguished from analysis, has been applied to organic chemistry with the most brilliant results, both for the science and for the world.

We have now reached the third stage in the study of our science. So soon as we gain an insight into the character of an organic body, from the application to it of the methods of proximate analysis, we may predict what may be done with it by the aid of synthesis; what alterations in its structure may be made by the action of other bodies upon it; what complex substances may be built up with the aid of it. We open up, it will be seen, a vast field of possibilities, many of them fraught with the most valuable and far-reaching results. The chemistry of to-day is no longer an empirical science, but we are able to reason from its general laws, and to predict what will be the result under a given set of circumstances.

I propose, this evening, to take this latest and most highly developed branch of the science, organic chemistry, and ask whether it is of value to pharmacists to study its theories and methods of classification, and whether it has a practical side for us.

Before proceeding to our subject, let us ask as a preliminary question, what is organic chemistry? It is the chemistry of carbon compounds, and all the products of vegetable and animal life are carbon compounds. But what are the materials handled by the pharmacist? A very little reflection will tell us that it is just these products of plant and animal life that constitute five-sixths of our *materia medica*, and are the basis of the preparations to be made in pharmacy. Obviously, then, this is the branch of the subject that we should consider, because it embodies the results of what is known about the very things that the pharmacist must work with daily. We would seem to be saying only what the plainest reason dictates when we state that a well-educated pharmacist ought to have not only a thorough acquaintance with the results but some knowledge of the theories of modern organic chemistry.

Can he follow intelligently the directions of the books for making an oleate unless he knows the difference between a natural fat and a fatty acid? Should he not know that there is more difference between essential and fixed oils than simply the smell? If he proposes merely to compound prescriptions satisfactorily, must he not be acquainted with the general principles of classification of organic compounds, so as not to be led into grievous mistakes? What is a committing of lists of incompatibles but a crude attempt to master just this difficulty? If, however, he is ambitious to do a little manufacturing of pharmaceutical preparations of his own, for profit, is it advisable for him to risk both his money and his professional reputation unless he has a very thorough acquaintance with his article and the best conditions for its manufacture?

We shall most readily prove our point in this case by examining some of the objections made to the study of modern organic chemistry, and seeing how far they are tenable on general grounds and to what degree they apply in the special case of the pharmacist.

It is said that works on organic chemistry are filled with too much theory and speculation—matters which practical men find it difficult to understand and in which they take no interest. We would say in reply that such is the mass of material collected in this domain of organic chemistry that working theories are absolutely necessary as frame-work upon which to arrange the multitude of facts and observations. Let any of us take up one of the treatises on organic chemistry of, I was going to say, twenty-five years ago, but I know works on

medical chemistry, now in use, in which the confusion among the organic compounds is something really bewildering to the student. Alcohols, ethers, acids, glucosides, alkaloids, etc., are all enumerated in succession, under the meaningless name of organic principles. It is one of the points of greatest pride for modern organic chemists that order and system has been brought out of this chaos. To do this, however, a set of theories must be accepted for the time. No undue value need be placed upon them, but they are indispensable in their place. We must co-ordinate facts as they are observed, and the use of the synthetical methods before alluded to as of such value for organic chemistry presupposes that we have mapped out in theory some line of reactions which we expect will be followed in nature so soon as we supply the conditions. Let me illustrate. A great deal of ridicule has been expended upon the benzol theory of Kekulé, which has been called a piece of phantasy without any facts upon which to base itself. Yet this theory, first promulgated in 1867, has been the frame-work upon which the wonderful growth of the coal-tar color industry has taken place. The discoverers of all the anilin, naphthalin and anthracene colors since that date have used it as their working theory, and their results are all in accordance with its teachings. An idea of the extent of this industry may be gathered from the following figures given in a paper read by Mr. W. H. Perkins, an English chemist, himself one of the earliest discoverers of anilin colors. The author places the value of all the coal-tar colors produced in Europe in 1878 at $15,750,000, divided as follows:

Germany,	$10,000,000
England	2,250,000
France,	1,750,000
Switzerland,	1,750,000
Total,	$15,750,000

Germany has at present seventeen coal-tar color works, England has six, France five and Switzerland four; besides which there are three works in Germany and as many in France which manufacture anilin in enormous quantities for the production of the coal-tar colors. Of alizarin the total production is estimated to be 9,500 tons, representing a money value of $7,225,000. The noteworthy and instructive thing about this whole subject is the fact that these enormous industries, which have sprung into existence since 1856, are entirely the fruit of

theoretical researches in organic chemistry, and these researches may, in the future, bear practical fruit even more valuable.

So much may be said on the general question of the importance of organic chemistry and in defence of its present form and methods. Let us now turn to the second question and ask, Has it any special practical value for pharmacists? We have already called attention to the fact that its very subject matter gives it such an importance, dealing as it does, with the very substances which the pharmacist more especially has to handle. We will, therefore, turn to the history of organic chemistry, and see what it has accomplished that has proved of service to pharmacy, and finally ask whether it promises anything to our science for the future.

First of all, the methods of proximate analysis characteristic of organic chemistry, and so carefully elaborated by her students, have given to pharmacy a large number of her most valuable remedies. From the opium known since before the Christian era, Sertürner, in 1816, after an investigation extending over eleven years, isolated morphia, gave to the world one of its most valuable medicines, and, at the same time, proclaimed the existence of vegetable bases or alkaloids. From the Peruvian bark, officinal since 1677, Pelletier and Caventou, in 1823, isolated quinia and cinchonia. Instead of a tincture of gall-nuts modern pharmacy uses the chemically pure tannin. So soon as organic chemistry isolates the active substance of a medicinally valuable plant, be it essential oil, glucoside or alkaloid, she has enabled pharmacy to replace the use of a crude drug by that of a pure substance possessing the same powers in a much more concentrated form. The application of the same methods of analysis are of the greatest value to pharmacy in enabling one to detect adulterations of valuable drugs, and as a means of estimating their commercial value. An excellent illustration of this occurs to me. While the vanilla extract has been used in pharmacy for many years, no reliable method of estimating the percentage of vanillin, its only valuable constituent, existed. Tiemann, in 1874, made artificial vanillin, and wishing to know the value of a definite weight of it, as compared with a corresponding weight of the vanilla beans, sought for a method of estimating the strength of the beans in vanillin. Nothing better was known than a comparison of the flavoring power of extracts from different samples of beans, and as few persons agree exactly in taste this was unreliable to the last degree. After

repeated experiments he devised a method, and was enabled to determine exactly the percentage of vanillin in any sample of the beans.

In the application of her synthetical methods modern organic chemistry has also done the greatest service to pharmacy. Substances which are found in sparing amount in nature, but which are valuable as medicinal remedies, have been investigated, and so soon as their exact chemical nature was understood organic chemistry has undertaken the task of producing them artificially from other more accessible materials, and, in many cases, with the most gratifying success. The price of a valuable chemical preparation has thus been reduced often a hundredfold, and its use correspondingly widened. From the long list of organic syntheses I may be allowed to select a few examples of substances of practical application in pharmacy.

Thus, all the fatty acids can be made at present artificially. Instead of being dependent upon the valerian-root or dolphin oil for valerianic acid and valerianates, it is prepared by the oxydation of amyl-alcohol.

Lactic and succinic acids are both made synthetically, and their salts are correspondingly more available for general use.

The oil of mustard is now made synthetically from allyl-iodide (a derivative of glycerin) and potassium sulphocyanate. Closely related to this chemically is oil of horseradish root, which was proved by Hofmann to be essentially butyl-sulphocyanate, and of course can be prepared synthetically.

Oil of Spiræa ulmaria is mainly salicylic aldehyde, and can be made by oxydizing salicin.

Oil of cinnamon was proved by Strecker to consist chiefly of cinnamic aldehyde, and is made artificially from storax balsam.

Oil of rue was shown by Gorup-Besanez to be methyl-nonyl ketone, a compound readily built up from its constituents.

Vanillin, the flavoring substance of the vanilla bean, has been made artificially from coniferin, a glucoside contained in the sap of pine-trees, from oil of cloves, from resin of guaiacum, and lastly from carbolic acid itself.

Coumarin, the active substance in tonka beans, has been made artificially from acetic acid and salicylic aldehyde.

Salicylic acid is now made commercially under Kolbe's patent from carbolic acid.

Benzoic acid can be gotten from gum benzoin or made from phtalic

acid, a coal-tar product, or from hippuric acid, which is found abundantly in the urine of herbivorous animals. For the sake of those who have prejudices we may say that the officinal benzoic acid is prepared solely by the first process.

Indigo-blue has been prepared artificially by Baeyer. As yet the process is hardly simple enough to be made a commercial one, but there is no doubt that it will ultimately be made so.

In the group of alkaloids not so much has been done as yet, but as the incentives are very great we have every reason to await greater results in the future.

Schiff prepared, in 1870, paraconine, an alkaloid, isomeric with true conine but differing from it in properties.

Caffeine is shown to be the methyl derivation of theobromine and can be prepared from it.

Atropia has been made artificially by Ladenburg by combining tropine and tropic acid, the two decomposition products of the original alkaloids. He is now engaged in the effort to build up synthetically these two simpler compounds, and with all hopes of success. The artificial atropia has the same physiological action upon the eye as that possessed by the natural alkaloid, and appears to be identical with it in every respect.

Chinolin, a product of the treatment of the quinia alkaloids with caustic potash, has been recently prepared synthetically by both Kœnigs and Baeyer. The synthesis of cinchonia is now being attempted by several chemists with strong prospects of success.

The most recent synthesis effected, and one of the most interesting and suggestive, is that just effected by Michael in Wurtz's laboratory. He has built up helicin, the oxydation product of salicin, from a derivative of glucose, called aceto chlorhydrose and salicylic acid. As helicin is reducible by nascent hydrogen to salicin, this is equivalent to a synthesis of the glucoside itself. Moreover, the method is a general one, and Michael promises to attempt at once the synthesis of other and more important glucosides.

It will be seen from this imperfect list that much has been accomplished in the past; but what has been done is only an earnest of what we may expect in the future from the rapidly increasing attention now directed to this subject. If in the ten years, from the discovery of artificial alizarin, by Graebe and Liebermann, in 1868, the production

of that one substance could grow so that for the year 1878 the product was valued at over seven millions of dollars, what may we not expect, as organic compounds become more fully studied and are better known. Very many of us may live to see morphia and quinia made artificially, and their production so cheapened that their price may be reduced to a fraction of what it is now.

And let me ask, in conclusion, are you, the pharmacists of the coming era, to have no hand in this work? Sertürner, the discoverer of morphia; Pelletier and Caventou, the discoverers of quinia, cinchonia, strychnia and veratria; Runge, the discoverer of carbolic acid, and Soubeiran, the discoverer, simultaneously with Liebig, of chloroform, were all pharmacists. If we turn to the list of former professors in this school we find the names of men who have contributed greatly to the progress of organic chemistry. Many of the most honored names of living workers in this field are those of pharmacists, or those who have had their education in the school of practical pharmacy. Let us hope that in the brilliant future opening before organic chemistry pharmacists will not fail to do their share of the work and to reap their share of the rewards.

CULTIVATION OF TOBACCO IN KENTUCKY.

By Watson Megill, Ph.G.

From an Inaugural Essay.

The cultivation and handling of tobacco engages the mind and occupies the time of our Kentucky farmers probably more than all the rest of their products combined: as I will presently show that the crop is a continuous one, scarcely ever off their hands; for no sooner is one crop disposed of than the preparation of the soil for the succeeding one begins. It is well to bear in mind that these remarks on cultivation do not apply to all portions of the State, for the tobacco-raising section is principally in the western half. The farmers in the eastern half devote their time and attention to fine stock and small grain.

Of all the States engaged in the cultivation of tobacco Kentucky takes precedence, raising in 1875 130,000,000 pounds. This quantity is more than twice the product of any other State for the corresponding year. When we stop to consider that this immense quantity is princi-

pally produced in about twenty counties, the reader can gain a slight idea of the extent and amount of culture this important staple requires.

The first and most important step is the selection of suitable soil for seed-beds. A rich loam is the soil for tobacco plants. The spot for a bed should be the south side of a gentle elevation, as well protected as possible by woods or shrubbery. After a thorough burning of brush dig deep, and continue to dig, rake and chop until every clod, root and stone be removed; then level and pulverize nicely with a rake. As to the variety for planting, the blue prior and yellow prior are very good, but the variety known as little hill is considered the best. However, we must not fail to remember that culture has more that anything else to do with successful tobacco raising. Mix about one gill of seed, for every ten square yards, with a quart of sifted ashes, and sow it regularly the same as gardeners sow small seed, only with a heavier hand; roll with a hard roller or tramp with the feet. If the bed is sown early it ought to be covered with brush free from leaves, but it is not neces- to cover it after the 1st of March. Tobacco beds may be sown at any time during the winter, if the ground be not too wet or frozen. The best time for sowing is from the 10th to the 20th of March, though it is well to sow at intervals when the ground is in fine order. Never sow when the ground is in poor order, for the work will be wasted. The beds must be kept free from grass and weeds.

From the time the plants present themselves until replanted, they should be lightly manured occasionally. If possible, the plants should stand in the bed from half an inch to an inch apart, and, if too thick, must be raked out with an ordinary iron rake.

The soil best adapted to the growth of tobacco is a light friable soil, not too flat, but rolling, undulating land, not liable to drown in excessive rains; new land is far better than old. Ashes are decidedly the best fertilizer for tobacco.

The tobacco land should be well plowed in April, taking care to turn the turf completely under, and let the land be well harrowed directly after breaking up, so as not to disturb the turf beneath the surface. When the plants are of good size for transplanting and the ground is in good order for the reception, the land, or so much as can be planted in a "season," should be "scraped," which is done by running parallel furrows with the seeding-plow two-and-a-half feet apart, and then crossing these again at right angles, preserving the same dis-

tance, which leaves the ground divided in checks or squares of two-and-one-half or three feet each way. The hoes are put to work, and the hill is formed by drawing the two front angles of the square into the middle, and then patted to smooth the top. The furrows should run shallow, for the hill should be low and well leveled off on the top, and, if possible, a slight depression so as to collect the water near the plant. The first fine rain thereafter the plants should be removed from the beds and one carefully planted in each hill. A brisk man can plant 7,000 or 8,000 plants per day; the smaller or weaker hands precede the planters and drop the plants. In drawing the plants from the bed great care is necessary to prevent bruising. The plants should never be planted deeper than they stood in the bed. The planting is done thus: Seize the plant dropped on the hill with the left hand, with one finger of the right hand make a hole in the centre of the hill, and with the left put in the root of the plant. The dirt is then well closed around the plant by pressure with the hands. If sticks are used in making the holes they should not be too long. The plant should be carefully planted, for if placed in the ground too deep or crocked it is not likely to flourish. In three or four days they may be weeded out and the soil gently loosened up around the roots. From this time on tobacco requires considerable attention, and great care is necessary to keep out the weeds. After the plants become too large for a small plow the hoe must be resorted to; care is necessary to leave the land as level as possible.

When the blossoms appear the best plants should be selected, say about one hundred, being enough to serve for seed to sow a crop of 100,000. All the rest should be topped before blossoming, indeed as soon as the blossom bud is fairly formed; it should be topped down to the leaves that are six inches long if early in the season, but if late still lower. If the season is favorable, in two weeks the plant is fit for cutting, yet it will not suffer by standing longer in the field. From this stage of the crop until it is in the house it is a source of vexation to the planter, who is fearful of storms, of frost, and worms—his worst enemy. The suckers are also a great annoyance; they spring from the bottom of the leaf where it joins the stalk; they are removed when two or three inches long. Ground-leaves are those at the bottom of the stalk, and should be removed when damp early in the morning to prevent crumbling. Worms are to be pulled off and killed as soon as they

appear, or they will destroy the crop. Turkeys are of great assistance in destroying these worms. They eat them, and kill thousands which they do not eat. There are two "gluts," as they are called by the planters, the first attacking the plant about the time they are half-grown, the other about the time it is ready for cutting. The first can be subdued by a good supply of turkeys and vigorous hand work. If care is taken to totally exterminate the first attack the second will be easy to manage, and the remaining worms may be killed by pinching their heads off. When they disappear there is but little danger of a second return.

We have now arrived at the time of what is called the "splitting process." This consists in splitting, with a knife made for the purpose, the plant from the top to a few inches of the bottom. The knife for splitting may be fully described by saying that it is a miniature spade. Care should be taken not to break the leaves during cutting. There are several manners of cutting tobacco, but that of splitting is preferred by our farmers. They contend that it cures brighter, quicker, and is less liable to house-burn or injury from too thick hanging. After the tobacco stalk is split, it is then cut down and allowed to wilt, when it is taken up, put across tobacco sticks and then hung on scaffolds, where it remains for three or four days, or until it turns yellow. The tobacco is now ready to be carried to the barn or tobacco-house, where it is hung up between the joists to complete the process of curing. A tobacco-stick is merely a straight stick about four feet long and one inch in diameter. They should overlap the joists about two or three inches, so that as the house is filled the tobacco may be pushed closer together.

After the house is filled some adopt the plan of firing, by putting fires under the tobacco. The tobacco under this plan cures much quicker, but is objected to by consumers and buyers because it acquires a smoky taste and smell. The cost of labor, loss of wood, and risk of losing both tobacco and barn, are great objections urged against firing. The better plan is to have sufficient house room, well ventilated by windows and doors. The tobacco is best hung scattering, so that the air and light may circulate freely. The rain and dampness, which materially injures the quality and color of the tobacco, should be excluded by closing doors and windows.

The next step is that of stripping. After becoming dry and well

cured, the stems and leaves being free from sap, they will become pliant during the first mild damp spell of weather, and may then be stripped off the stalks. The tobacco is first taken off the sticks and put in piles; then the leaves are stripped off the stalks, tied and put into bundles of one or two pounds. The bundles are formed by wrapping a leaf around the upper part of the handful of leaves for about three inches, and tucking the end in the middle of the hand to confine it. If the crop will permit, there should be four, or at least three, grades or qualities, viz.: 1st leaf, 2d lugs, and 3d trash; the three grades indicating the quality. The plant or stalk is then taken by a man called a "stripper," who removes all the defective leaves near the bottom of the stalk, which constitute the poorest grade or trash. The plant is then passed to another stripper, who removes the next inferior grade or lugs; the leaf is then removed by a third stripper.

Stripping cannot be done in dry or harsh weather; but if the planter desires he may, when a favorable season presents itself, take the tobacco down and pack it on the floor, or "bulk" it, as it is called. This keeps it in a suitable condition to strip during ordinary dry weather. The weather should not be too damp when tobacco is bulked, or it will generate heat; the leaves remaining on the stalks acquire a bad odor, change color, and if left too long will rot.

After the farmer finishes the process of stripping he again bulks the tobacco down lightly in a dry place under cover, watching it all the time to see that it does not get too damp. This about finishes the farmer's labors, who only has now to wait for a favorable season, a wet spell, when he can transport his crop to the tobacco merchant, who makes a business of rehandling and prizing the tobacco. The factories built for this purpose are immense, handling thousands of pounds per year, and employing from 25 to 150 assistants. In the factory it undergoes a process of bulking and thorough overhauling, and is assorted into grades that are suitable for smoking, chewing and snuffing, as well as grades for foreign and home consumption; by far the largest portion of tobacco raised in Kentucky reaching foreign markets. A great quantity of the tobacco is stemmed, *i. e.*, the mid rib is removed from each leaf. The stems are generally sold to the snuff makers. The prizing and packing processes consist in having a hogshead about forty inches across the head, and sixty inches long, which is placed under a powerful screw. A man gets in and lays the tobacco in a circle,

beginning in the middle, and each circle is extended until the outer circle reaches the sides. A single row of bundles is then laid around the edge of the heads of the last circle, then across the hogshead parallel with the former, always keeping the middle the highest; this is called a course. When several of these courses are run up the tobacco is nicely covered with boards and the screw is run down, and by powerful pressure by leverage the tobacco in bulk is reduced very considerably. This process goes on until the required or desired amount has been placed in the hogshead. The hogshead is now headed up and is ready for shipment; and this about concludes the almost ceaseless round of labor that is necessary to raise and prepare for market this important staple of Kentucky.

ESTIMATION OF MORPHIA.

By Phil. Hoglan.

In the "Journal" for July, 1879, Mr. A. Petit gives a process for the assay of opium, which, for simplicity and rapidity, leaves nothing to be desired. There is only one objection to be urged against Mr. Petit's process, and that is, that the operator is liable to use either an excess or a deficiency of ammonia, owing to the variable strength of this important reagent as found in the market. Should he use an excess his product will not represent the full strength of the opium, and if he employ a deficiency the morphia will not all be precipitated. A process which is as simple as Petit's, and as expeditious, is Rother's; besides, it avoids the danger of excess or deficiency of ammonia—by employing bicarbonate of sodium as the precipitating agent. As the process is short we insert it here as given by Prof. Wayne, of the Cincinnati College of Pharmacy.

Take 200 grains of opium, and rub with sufficient water to form a magma, and allow to stand six hours; filter, and rub the residue with water as before, and let stand; filter, and repeat the operation on the residue until about 12 fluidounces of liquid are obtained. Evaporate this by a water-bath to 1½ fluidounce and filter, washing the filter with a small amount of water. Now add 60 grains bicarbonate of sodium, dissolved in the smallest quantity of water; set aside for 12 hours; then pour on a filter and wash the precipitate first with a little

water and afterward with a mixture consisting of 6 fluidrachms each of alcohol, ether and water, dry the residue and weigh.

This gives a product entirely soluble in caustic potassa, and is therefore nearly pure morphia.

From a specimen of opium, which I examined the past summer, I obtained, from 200 grains, 21 grains of morphia, giving a full 10 per cent. of morphia. At the same time I tried three other processes, but none gave better satisfaction than the one just described. The following is a comparison: 200 grains of the opium yielded, by Rother's process, 21 grains; Staples' process (U. S. P.), 18 grains; Petit's process, 20·5 grains, and by Fordos' process ("Amer. Jour. Phar.," 1858, p. 47), 20 grains product.

We see that Rother's gives a rather larger percentage of morphia than Petit's, and meets the objection as stated against the latter in the outset.

Newcomerstown, O., Oct. 17, 1879.

CHESTNUT LEAVES.

By John B. Turner, Ph.G.

From an Inaugural Essay.

The leaves collected in September were first exhausted by petroleum benzin. On evaporation of the solution a fatty residue was obtained, sparingly soluble in alcohol and freely soluble in ether. The residue of the first maceration was then exhausted with ether. This solvent, like the benzin, extracted chlorophyll, but gave no reactions indicating the presence of resin. The solution obtained by treating the leaves with alcohol contains, besides chlorophyll, gallic and tannic acids. The infusion contains tannin, as is shown by a greenish-black precipitate with ferric chloride, and also by a precipitate being produced on the addition of gelatin. The tannin being all separated by the addition of gelatin and filtration, neutral ferric chloride was added: a bluish-black precipitate fell, the color of which disappeared on the application of heat; the presence of gallic acid was thus proven (? Editor). Gum was indicated by alcohol giving a precipitate soluble in excess of water. This gum is peculiar, not gelatinizing with solution of ferric chloride or sodium borate. Iodine failed to show the presence of starch. The gum was also precipitated by solution of subacetate of lead. The

infusion was tested for malic acid, but with negative results. The solution obtained by cold infusion, when heated, shows the presence of albumen. The leaves apparently contain no pectin, the decoction on cooling not becoming cloudy; on drying the leaves lost 58 per cent. of their weight. The dried leaves yielded 5·20 per cent. of ash, which contains salts of potassium, iron and calcium.

PODOPHYLLUM.

By C. J. Biddle, Ph.G.

Read at the Pharmaceutical Meeting October 21.

I regret that the time I could devote to the above subject was very limited, and that at present I can only give a brief account of what work has been done.

Prof. Maisch first interested me in the subject by a lecture in his course, during the winter of 1876 and 1877. I am not fully satisfied as yet with the results obtained, but hope to be able to give the subject further attention in future. Collections of the root were made in the months named below; it was washed, weighed and carefully dried.

March	3d.	1,000 grs.	when dry	weighed	220 grs.	Loss,	780 grs.
April	3d.	1,000	"	"	233	"	767
May	7th.	1,000	"	"	245	"	755
July	16th.	1,000	"	"	340	"	660
Oct.	12th.	1,000	"	"	317	"	683

It will be noticed by the above table that the weight of the dried root increases as the season advances until July is reached, when it is highest; it then begins to decrease, and in October it is much lighter.

A short description of the appearance of the plant at times of the different collections may not be out of place here. In March, when I made the first collection, it had not made its appearance above ground, but the bud was waiting for the heat of the spring sun. In April the plant was just coming above ground; in May it was in bloom; in July the fruit was mature, with the next year's portion of the rhizome near its full growth, and in October the stem of the plant had died away and the next year's rhizome, fully developed, including the rootlets and the bud, was seemingly waiting for spring to come.

The following table will show the yield of resin, etc. The root was treated as directed in the U. S. Pharmacopœia for resina podophylli.

	Yield of resin, in grs., from 1000 grains of dried rhizome.	Color of washings of resin.	Per cent. soluble in ether.	Washings react with Mayer's test.	Phosphomolybdic acid.	Ferric chloride.	Ferrous sulphate.	Chlorine water.	Argentic nitrate.	Alkalies.	Lead acetate.
March	49·30	Reddish brown	89	Precip.	Precip.	Dark Green	No Change	Slight color-ation.	Heavy white precip.	Dark brown	Yellow precip.
April	52·40	"	84	"	"	"	"	"	"	"	"
May	37·90	Light straw color	87	Very slight precip	No precip.	"	"	Scarcely per-ceptible.	"	"	Scarcely any precip.
July	28·30	"	90	"	"	"	"	"	"	"	"
Octob'r	32·40	"	78	"	"	"	"	"	"	"	"

It will be noticed that the washings for March and April showed different and more marked results with reagents than those of the three months that follow. All were treated in the same manner and subjected to the same influences. I was unable to get a precipitate with Mayer's test with the mixed washings when they were dilute, so each washing was concentrated to about six fluidounces, when a slight precipitate would show in the liquid near the top; in that of the three later months it could scarcely be seen.

The resins obtained show scarcely any difference in color, all being light colored with the exception of that from the April root, which is a little darker than the others, probably due to the chlorophyl of the young buds.

In evaporating the alcoholic tincture of the rhizome, when it had been reduced sufficient to pour in the acidulated water, every lot had small globules of oil floating on the surface.

The washings of March and April were dark colored, and on evaporating deposited a precipitate; those of May, July and October were very light straw colored, and also deposited a precipitate. This precipitate is probably a portion of the resin dissolved when it is washed, as I believe, with Prof. Maisch, that a portion of the resin is soluble in water, and that which is dissolved is purgative.

I know of a case where a lady purchased five cents' worth of the rhizome, made a tea of it, and drank a portion (the exact amount is not known), and it had a decided cathartic effect, so much so that she

returned to the store to ask if she had not been given the wrong article.

One thousand grains of the dried rhizome were boiled with three portions of water and expressed, and the resulting decoction was evaporated to the consistence of an extract, which weighed 540 grains, over 50 per cent. soluble in water. The portion remaining after making the decoctions was exhausted with alcohol and treated for resin; but the yield was scarcely perceptible, not more than two or three grains.

I am unable to review the literature of Podophyllum at present, but it was pretty well reviewed by Mr. F. W. Power in his article in the "Proceedings of the American Pharmaceutical Association" for 1877. The results obtained by me are different than I expected, and they also differ from those of Mr. Power.

ANALYSIS OF ERIODICTYON CALIFORNICUM.

By Chas. Mohr.

Read at the twenty-seventh annual meeting of the American Pharmaceutical Association, and communicated by the author.

Eriodictyon Californicum is receiving attention for its action in lung diseases and bronchial affections. What is its therapentical value, and to what is its activity due? Make a chemical examination of it.

In reply to this query it was found necessary to subject the plant to the regular course of analysis followed in the separation of the organic constituents of plants.

Ten grams of the air-dried herb, of good quality, successively exhausted by pure ether, alcohol of 95 per cent., and distilled water, yielded the following results:

1. The ethereal percolate, evaporated spontaneously and finally by application of gentle heat, was mixed with water. A copious precipitate of resinous matter occurred; the supernatant aqueous liquid, after having been freed from suspended resin, was of a very pale straw-color, slight taste and faint acid reaction.

A. *Examination of Resinous Precipitate.*—By treating with boiling alcohol of 70 per cent. for an hour, and subsequent maceration at a low temperature for 24 hours, filtering and washing the undissolved portion with alcohol of 70 per cent., and digesting the concentrated

filtrates with animal charcoal, evaporating and exsiccating over sulphuric acid, a brittle resin was separated having a yellow-greenish color, slight acid reaction, aromatic, acrid slightly bitter taste, faint odor, and fusing at about the temperature of boiling water. The portion left undissolved by alcohol of 70 per cent. was treated with hot alcohol of 95 per cent., as long as this dissolved any of the material.

A grayish soft and tenacious substance was left, not volatile, on stronger heating fusing and burning with a smoky flame, destitute of taste and odor, insoluble in alcohol, partially soluble in petroleum naphtha, ether and benzole, readily soluble in chloroform and in a mixture of carbon disulphide and absolute alcohol, which facts prove its identity with caoutchouc. From the hot alcoholic solution, on cooling, a soft waxy substance separated, forming a pellicle; this substance, freed from adhering resin by continued washing with cold alcohol, possesses a greenish-white color, proven to be a vegetable wax. The quantity obtained was too small to permit a closer study of its properties. The remaining alcoholic liquid was of a dark green color, possessing no peculiar taste or odor, and was completely decolorized by animal charcoal, and could not be regarded as a resin proper but as inert coloring matter.

B. *Examination of the Aqueous Liquid.*—No crystallizable substance was obtained, and on application of the proper tests no indication of an alkaloid or nitrogenous compound was obtained. The acid found present in small quantity proved to be a tannic acid precipitated by ferric chloride, almost black in color.

2. The *alcoholic* percolate was evaporated to a small bulk and mixed with water.

The insoluble resinous portion obtained consisted entirely of coloring matter, its alcoholic solution being without taste or odor, was entirely decolorized by animal charcoal.

A portion of the aqueous liquid, after being entirely freed from resinous coloring matter, was concentrated by slow evaporation and left on ice for several days. It yielded no crystals, and the application of alkaloid tests led to no results. To be firmly convinced on this point a portion of the liquid was digested with oxide of lead to remove tannic acid, the filtrate evaporated to dryness and extracted with hot alcohol of 95 per cent.; the solution on spontaneous evaporation left

no residue. Another part of the same liquid was examined for organic acids; a tannic acid was found, which precipitated ferric salts green.

To separate the organic acids lead acetate in solution was added until further addition produced no precipitate; filtered; the filtrate was treated with ammonium hydrate to a still feeble acid reaction, and on addition of acetate of lead no turbidity was produced, thus showing all organic acid present were contained in the leads precipitate, which is absolutely insoluble in boiling water.

The lead precipitate was dissolved in acetic acid, reprecipitated by ammonia, carefully washed and, whilst still moist, mixed with absolute alcohol, and decomposed by means of sulphuretted hydrogen, filtered, and the filtrate evaporated to dryness, at a low temperature; the tannic acid was obtained as an amorphous brittle substanee, of a clear yellowish-brown color, having an astringent acidulous taste. It was perfectly soluble in alcohol, yielding a turbid solution in water, which, on addition of solution of the alkalies, turned to deep reddish-brown color, and became perfectly clear.

Ferric chloride gives a green precipitate, turning to a dirty gray on standing; it is dissolved by ammonia, yielding a solution of a dingy purple color, and is decolorized by oxalic acid.

Sulphate of cinchonia gives a copious white precipitate.

Plumbic acetate yields a golden yellow precipitate, not dissolved by potassic hydrate.

Plumbic subacetate yields a dingy-yellow precipitate, soluble in potassic hydrate.

Tartar emetic, no precipitate.

Glue, no precipitate.

Hydric sulphate dissolves it with a deep crimson, somewhat purplish color.

Argentic nitrate—on heating, the metal is partly reduced in the specular form.

Diluted hydric sulphate, when added to either alcoholic or aqueous solutions, shows a peculiar behavior by rendering the solution at first milky white, and, on short standing, a viscous brownish mass separates. Fehling's solution then added, copper is reduced.

This decomposition, effected by diluted sulphuric acid, takes place very rapidly at ordinary temperature, and this fact and the general

behavior to other reagents proves it to be a glucoside of the tannic acid series, of decided peculiaritites, closely allied, if not identical, with that found by the writer existing in Pycnanthemum linifolium and perhaps to exist in Ballota vulgaris and Leonurus cardiaca (*Rochleder*).

To obtain the acid in sufficient quantity, so as to be able to study its properties more closely, and particularly to satisfy myself that it is not associated with any other solid organic or volatile acids, such as benzoic or cinnamic acid, a fresh quantity of dried herb was extracted by alcohol of 75 per cent. The alcoholic extract, freed from resin by addition of water, was treated with plumbic acetate, the precipitate dissolved in acetic acid, reprecipitated by ammonia, decomposed by sulphuretted hydrogen under absolute alcohol. The acid as obtained, tightly enclosed between two well-fitting watch-glasses, was exposed to a temperature of 220° to 240°C. for some time. As no sublimation took place, the absence of all solid volatile acids of the aromatic series was proven.

3. *Treatment of the Herb with Water.*—The aqueous percolate of the herb previously exhausted by ether and alcohol successively was of a brown color, showed acid reaction, and possessed an astringent, bitterish taste. The examination was conducted the same as in the case with the liquid under No. 2; the same tannic acid was alone found. A portion of the percolate concentrated by evaporation gave on addition of absolute alcohol, a copious precipitate readily soluble in water, and proved to be gum associated with a brown inert matter; sugar in small quantities was detected. No alkaloids or nitrogenous body could be detected.

Ten pounds of the leaves subjected to distillation with water yielded a distillate containing very small quantities of a volatile oil, adhering to the sides of the receiver and forming a very thin layer upon its surface, too minute to allow of a separation and subsequent nearer investigation. It imparts to the distilled water an aromatic odor and taste but slightly resembling that of the dried plant. Tested immediately after distillation, it was found entirely neutral towards test-papers, and not the slightest reaction was obtained with any of the alkaloid tests, so that it may be safely asserted that the plant does not contain any volatile alkaloid.

By these results it was ascertained that Eriodictyon californicum contains

Volatile oil in small quantities, not further examined.

Moisture, ...	12·50
Matter extracted by ether, ...	14·98
(Consisting of a bitter, acrid, brittle resin, 8 per cent.; inert green coloring matter, caoutchouc, wax in small quantity, tannic acid in small quantity.)	
Matter extracted by alcohol, ...	10·79
(Consisting of inert resinous matter decolorized by animal charcoal, a peculiar glucoside of the tannic acid series predominating in the mass.)	
Matter extracted by water, ...	18·42
(Consisting of same tannic acid above mentioned, gum, brown extractive inert substance, trace of sugar.)	
Wood fibre and ash, ...	43·31
	100·00

From the above analytical results it is evident that the therapeutical value of the plant rests solely upon its stimulating and astringent effects upon the mucous membrane of the respiratory apparatus, especially the bronchial tubes, due to the action of the brittle acrid resin exciting secretion and promoting expectoration, the astringent tannic acid imparting tone and solidity to the membranes in a state of relaxation. How far in this respect the drug will prove to be equal or superior to the numerous remedies of like therapeutic effect, and how far its reputation amongst the people of the country where Yerba santa is found indigenous is sustained when employed by the profession, must be decided by the practitioner.

In this locality the fluid extract of the herb has been used by some physicians quite extensively. A medical friend who has used it on the strength of its repute, and given it what he considers a fair and searching trial in lung and bronchial affections, did not find his expectations realized, and has since dropped the use of it, as possessing no advantages over the remedies to which he heretofore had recourse.

The results of my experience show that a menstruum of alcohol of 70 to 75 per cent. yields the best preparation.

Mobile, Sept. 6, 1879.

GLYCERITUM FERRI SUBSULPHATIS.

By L. E. Sayre, Ph.G.

Read at the Pharmaceutical Meeting, October 21.

A liquid preparation of Monsel's salt, free from acid or irritating properties, bearing a definite and easily recollected ratio of strength to the salt in question, with a basis of glycerin or some other liquid as capable of permeating tissue, is one of the pharmaceutical wants of the present time. That such a preparation would be appreciated by the medical practitioner needs no argument. To be convinced of this it is only necessary to note the frequency with which preparations of various strengths of the substance in question are prescribed to be compounded extemporaneously. These combinations have grown greatly in favor of late years in the treatment of various kinds of mucous discharges and chronic ulcerated surfaces where a powerful astringent effect is required; they are highly commended by some in the treatment of diphtheria. In vaginal, rectal and local hemorrhages they are believed to have advantages over the officinal solution in forming less hard and irritating clots when applied to such delicate parts. Such preparations cannot be compounded extemporaneously from the subsulphate of iron, which are desirable for the physician or creditable to the pharmacist. The argument then is greatly in favor of the adoption of a standard preparation which would do both justice.

The commercial persulphate (so called) is found in the shops in a yellow pulverulent mass, or in powder. It is very slowly and imperfectly soluble in water or glycerin—it probably contains oxysulphate. Several samples of the salt have been tried, and they all proved incompletely soluble in water or glycerin, either cold or boiling. The perfectly soluble and deliquescent Monsel's salt can be produced by evaporating the officinal solution at a moderate temperature upon porcelain or glass plates; but this is an unstable salt and very inconvenient to handle, its proneness to change suggests the idea of making it at once into a glycerite of definite strength, so that it may be at once ready for use, or can be made so by simple dilution.

A glycerite containing fifty per cent., by weight, of the salt furnishes perhaps the most convenient form, and, furthermore, one which possesses qualities which renders such a standard of strength most desirable.

The process adopted for its manufacture consists in first preparing a solution of the subsulphate, following the directions of the Pharmacopœia for the solution; this is evaporated in a tared capsule at *moderate temperature* until a thick viscid liquid is obtained; this is then diluted with a sufficient quantity of glycerin to produce a solution of the above percentage. In order to use this process the quantity of dry subsulphate of iron in the officinal solution must be known. By careful experiment it has been found to contain 47 per cent. The use of weight instead of measure, in the formula, is suggested by the writer as being easier and apt to secure more accurate manipulation.

The following process is recommended, the finished glycerite measuring about twelve fluidounces, the quantity directed by the U. S. Pharmacopœia for the solution:

Take of liquor ferri subsulphatis 6·127 grains, evaporate to 3·963 grains, continue the heat and add glycerin sufficient to make the weight 5·760 grains.

This furnishes the easily recollected percentage of dry salt, half its weight being Monsel's salt, each fluid drachm representing about 50 grains of subsulphate of iron—in exact figures 51·08 grains.

It can readily be diluted to any extent without destroying its transparency, either by water or glycerin, and in this respect furnishes a much superior article for compounding than the dry salt of commerce. Its viscidity renders it of that plastic character so very advantageous where the application is intended to remain upon the surface of the affected part and in addition to the styptic effect of the iron salt, the glycerin exercises its emollient properties in many ways and particularly in preventing the formation of the irritating clots and crusts peculiar to the salt itself or its solution.

CHEMICAL NOTES.

By Prof. Samuel P. Sadtler.

Inorganic Chemistry.—The discovery of supposed elements in the yttria and erbia minerals has not yet come to an end. Clève has been studying some preparations containing erbia, and some residues left after the extraction of scandia and ytterbia, and announces the discovery of *two new elements*, one of which he calls *Thullium*, from Thulé, the ancient name of Scandinavia, and the other *Holmium*, from the latin-

ized name of Stockholm, in the neighborhood of which so many of the yttria minerals are found. To the former he gives an atomic weight of about 113, with the symbol *Tm*, and to the latter less than 108, and the symbol *Ho*. The oxide of thullium he describes as being of a light rose color, while the holmium oxide is more or less yellow. No distinctive reactions are given, except the spectral lines which he considers characteristic enough to justify him in making this announcement.—*Comptes Rendus*, Sept. 1st, 1879.

Remarks upon the supposed New Elements of Clève.—At the next meeting but one of the French Academy two papers were read in criticism of the foregoing announcement of Clève. Loret points out that the two rays regarded by Clève as characteristic of holmium were first noticed by him in April, 1878, and were then said to belong to some new earth, associated with erbia and provisionally designated as *X*. Since then Delafontaine has described philippia, and shown it to be the provisional *X* of Loret. Again, Loret considers that the single red ray, which Clève ascribes to the new element thullium, is hardly proof enough to justify one in making any statements of new elements, especially as it seems to be found in the spectrum of erbia at times, and again in mixtures of erbia and ytterbia under conditions not fully studied as yet.

Lecoq de Boisbaudran also gives results of his upon different erbia preparations, which confirm, in his mind, Loret's opinion as to the earth first designated *X*, but leave him uncertain as to whether any other new earths exist in the erbia preparations or not. Until the spectral observations can be confirmed, by well-defined chemical reactions, it seems at least premature to continue these announcements.—*Ibid.*, Sept. 15th, 1879.

The supposed Compound Nature of the Elements.—Prof. J. Norman Lockyer, in a paper read before the recent meeting of the British Association, at Sheffield, makes the following statements: "Continuing my researches into the nature of the so-called elements, I have found that, when carefully distilled metallic sodium was condensed in a capillary tube, placed in a retort and heated in a Sprengel vacuum, it gave off twenty times its volume of hydrogen. Phosphorus, carefully dried and submitted to the same treatment, gave off 70 volumes of a gas which appeared to consist chiefly of hydrogen. Although it gave some of the lines of phosphorus, it was not PH_3, as it had no action upon solution of cupric sulphate. A specimen of magnesium, carefully purified

by Messrs. Johnson and Matthey, gave me a magnificent series of colored phenomena. The hydrogen lines first appeared, then the *D* line—not the sodium line, be it understood, for the green line was absent—and lastly the green line of magnesium (*b*), and then, as the temperature was increased, mixtures of all these lines, with the blue line (the *D* line) being always the most brilliant. In this experiment only two volumes of hydrogen were collected. From gallium and arsenic no gas of any kind was obtained. From sulphur, and some of its compounds, sulphurous anhydrid was always obtained. From indium hydrogen was given off in vacuo before heating, while from lithium no less than 100 volumes of hydrogen were given off. The conditions of the experiments were always the same, the only variable being the substance itself.—*Chemical News*, Sept. 5th, 1879.

Organic Chemistry.—*On the Carbohydrates of the Helianthus tuberosus (Jerusalem Artichoke).*—Dieck and Tollens have made an examination of these tubers with a view of determining what species of carbohydrates were present. They sum up their results as follows: 1st. In the tubers examined by them little or no inulin was found, but læoulin in considerable amount, and right-rotating sugar. 2d. Læoulin has the composition $C_6H_{10}O_5$ which is ascribed to starch, dextrin and the gums. It is optically inactive, and agrees in other respects with gum and with dextrin. It gives the alcoholic fermentation with yeast. 3d. Læoulin yields læoulinic acid on boiling with sulphuric acid. 4th. The sugar produced from læoulin reduces Fehling's solution strongly, and possesses a specific rotatory power to the left of $[\alpha]$ 4*d* at 20°C., which equals 52° reckoned for læoulin, and 47° reckoned for sugar. 5th. The juice expressed from the artichoke, when fermented with yeast, yields, in abundant amount, a spirit which after a time has a very pure taste. Farther study seems quite desirable here. Previous heating with sulphuric acid increases somewhat the yield. 6th. In the fermented juice mannite and glycerin and, in one case, succinic acid were recognized.—*Ann. der Ch. und Ph.*, 198, p. 228.

Partial Synthesis of Milk-sugar.—E. Demole has found that the two glucoses produced by the action of acids upon milk-sugar may be made to lose a molecule of water and reunite to form a molecule of lactose again. He recognizes a profound difference between milk sugar and cane-sugar in this respect. Two molecules of dextro-glucose reunited, and with loss of water, will not in any case reconstitute cane sugar.

The galactose and lactoglucose, resulting from the decomposition of lactose, were freed from acid and carefully evaporated to dryness. They were then treated with three parts of acetic anhydrid and yielded a body having all the properties of octacetylated milk-sugar. This, on decomposition with caustic baryta, yielded pure lactose, possessing the same crystalline form, optical rotatory power and other properties as the natural material.—*Comptes Rendus*, Sept. 1st, 1879.

Study of the Chlorophyll Coloring Matter.—After treating leaves of grass for several days with ether, and thus extracting the wax, Hoppe-Seyler has obtained, with hot alcohol, a solution of two coloring matters, both of which may be easily gotten crystallized. One of these, difficultly soluble in alcohol, and not very soluble in ether, separates out on moderate concentration in quadratic tablets of greenish-white color and silvery lustre; the other is gotten in microscopic needles, dark-green by reflected and brown by transmitted light on evaporating to dryness and taking up the residue in ether or hot alcohol. The first compound is evidently the erythrophyll described by Bougarel, but the second has not been described as yet. Its crystals have the consistency of soft wax, and are very difficultly soluble in cold alcohol, more readily in hot alcohol, and very easily soluble in ether or chloroform. Its solutions show the characteristic absorption spectrum of chlorophyll as well as its reddish fluorescence. Analyses show it to contain: C 73·4, H 9·7, N 5·62, O 9·57, P 1·37, Mg 0·34 per cent. Whether the phosphorus and magnesium belong to the coloring matter itself or whether in spite of treatment with alcohol, crystallization, etc., traces of lecithin and similar impurities remain, the author cannot say. The crystals show no impurities under the microscope. To this coloring matter, the relations of which to chlorophyll must be very intimate, Hoppe-Seyler gives the name chlorophyllan. The properties of the new coloring matter will be farther studied.—*Ber. der Ch. Ges.*, xii, p. 1555.

George Fraude communicates additional results obtained in the study of the alkaloid *Aspidosspermia* contained in Aspidossperma quebracho blanco, *Schlechtd.* He finds, as the result of repeated analyses of very pure material, that $C_{22}H_{30}N_2O_2$ expresses its composition. One part of the finely-pulverized crystallized aspidosspermia is soluble in 6,000 parts of water at 14°C. The solution possesses a distictly bitter taste. One part is soluble in 48 parts 99 per cent. alcohol, at 14°C. One

part is soluble in 106 parts of ether, free from water and alcohol, at 14°C. Its most characteristic reactions are, first, the intense red color obtained with perchloric acid solution; second, with concentrated sulphuric acid and peroxide of lead we get a brown color, which passes into a cherry-red. If potassium bichromate and sulphuric acid be used as oxydizing materials we obtain a brown color, which slowly passes into an olive-green shade. All these reations are very similar to those obtained under corresponding circumstances with the strychnos species, which aspidosspermia resembles strongly.—*Ibid.*, p. 1560.

Applied Chemistry.—In order to determine whether a sample of *ammonia* has been obtained from the commercial liquors of the gas works or not, put in a test-tube several cubic centimeters of colorless nitric acid, which has been diluted with one-fourth its bulk of water, and add the ammonia drop by drop. If the ammonia contains tarry matter dissolved, a currant-red color is produced, owing to the anilin and toluidin, and the heat developed at the same time makes the tarry odor distinctly recognizable.—*Chemiker Zeitung*, 1879, No. 11.

Beeswax is often adulterated with ceresin, carnauba wax, paraffin or a mixture of these bodies. To detect this adulteration, Buchner determines the specific gravity of the wax in question. Pure beeswax has a specific gravity of 0·96, or, as determined by others, 0·94 to 0·97, while all of the above named adulterants have a lower specific gravity. For the sake of simplicity, alcohol of 0·945 specific gravity is taken, and the sample is thrown in it. If the wax sinks it is pure, if not it is adulterated. In order to separate the mixture, the wax is saponified with concentrated alcoholic potash solution, and digested for a considerable length of time on the water-bath, in order to hinder the solidifying whereby the paraffin separates out.—*Ibid.*, 1879, No. 12.

GLEANINGS FROM THE GERMAN JOURNALS.

By Louis von Cotzhausen, Ph.G.

Decomposition by Solutions of Salts and by Distilled Water.—Filtering-paper, however pure and previously well washed, communicates some organic matter to filtering solutions of salts and to pure distilled water (assisted by the oxygen and carbonic acid of the atmosphere). *Cellulose*, acted upon by diluted acids or salts, containing oxygen in aqueous solutions even at an ordinary temperature, gradually is

transformed into amyloyd and later into glucose, which is dissolved by the filtrate; the higher the temperature of the solutions, and the higher the percentage of oxygen in the salts, the more cellulose is decomposed and enters into solution. Since the formation of organized substances is only possible in the presence of organic matter, C. Bovet suggests a filter consisting of equal parts powdered asbestos and glass-wool to be used instead of paper; it filters equally as well, and does not contain organic matter.—*Pharm. Ztg.*, Sept. 6, 1879, p. 556.

The Decomposition of Digitalis-infusion is caused, in the opinion of C. Binz, by the formation of mould, the latter depending entirely on external, favorable or unfavorable, conditions; thus the same leaves sometimes yield an infusion which keeps well, and at other times one which soon gelatinizes. The author believes that the decomposition is often due to the formation of pectic acid.—*Ibid.*, Aug. 16, 1879, p. 506.

The Proper Season for Collecting Digitalis Leaves.—The German Pharmacopœia directs the leaves of Digitalis purpurea, growing spontaneously, to be gathered during the period of inflorescence, or, in other words, the leaves of plants of the second year's growth, which corresponds with the directions of the U. S. Pharmacopœia. C. Bernbeck considers the observation of these directions of the greatest importance, having become fully convinced by experiments that the leaves of plants of the first year's growth, which are usually the nicest and largest, contain a much larger percentage of pectin and pectose, and much less digitalin; the author also prefers the full-grown stem- to the lower young leaves.—*Ibid.*, Aug. 16, 1879, p. 506.

Collection of Narcotic Leaves.—According to W. Brandes, apothecaries, taking particular pride in the large size and elegant appearance of their narcotic leaves, pay a much higher price for them than for the unsightly small and frequently broken leaves, collected from plants growing wild and in bloom. In order to supply this demand the wholesale druggists are compelled to substitute the nicer leaves of cultivated plants, which, as generally conceded, are far inferior in regard to medicinal virtues, but compare very favorably with the former in appearance. Thus, efficacy is frequently sacrificed for the sake of elegance.—*Ibid.*, Aug. 30, 1879, p. 540.

The stigmas of maize have recently attracted considerable atten-

tion in Europe, being highly recommended by Dr. H. Dassein as a reliable remedy for complaints of the kindeys and bladder, inflammation of the gall, bladder and various diseases of the urinary organs. The author used an extract made from the stigmas. The virtues of this extract deserve to be further investigated.—*Pharm. Handelsbl.*, Sept. 10, 1879, p. 37, from *Gehe's Ber.*

Dragendorff's Test for Strychnia.—On adding iodic acid to strychnia the latter turns temporarily red, the color soon changing to a permanent reddish-brown. Francesco Selmi reinvestigated this subject, and found that the color-reaction does not take place between a minute quantity of strychnia in cold aqueous solution and the reagent, but becomes visible immediately on the addition of iodic acid to the evaporation residue of *one* drop of an aqueous strychnia solution, which has previously been saturated with dilute sulphuric acid (4 per cent.) Thus, 1 milligram strychnia, transformed into the sulphate, yields immediately, when tritutated with a small crystal of iodic acid, the temporary red coloration, which first turns brown, then cherry-red, then orange-red and finally (on the following day) bright-red with a scarcely perceptible violet tint, when the color remains unaltered for a long time. This red color changes to straw-yellow when saturated with sodium bicarbonate, the original color being again restored on the addition of acids. —*Pharm. Ztg.*, Sept. 10, 1879, p. 565, from *Bull. delle Scienze Med. di Bologna.*

Note on Aspidosspermia.—(See "Amer. Journ. Pharm.," April, 1879, p. 192). G. Fraude states that, according to Pedro N. Arrata's report, his (Fraude's) aspidosspermia was obtuined from Aspidossperma Quebracho "blanco," *Schlechtd.*, which explains why it has a different composition and different properties from the aspidosspermia isolated from Quebracho Colorado (for Quebracho Colorado see "Am. Journ. Pharm., March, 1877, p. 152); the author also claims that his original formula, $C_{22}H_{30}N_2O_2$, is correct, that the principle ought to be prepared at a moderate heat, and that 1 part finely powdered crystallized aspidosspermia is soluble at 14°C. in 48 parts 99 per cent. alcohol, in 106 parts ether, containing neither water nor alcohol, and in 6,000 parts water the aqueous solution still possessing a distinct bitter taste. The bark of Aspidossperma Quebracho blanco is not yet an article of commerce.—*Ber. d. Deutsch. Chem. Ges.*, 1879, p. 1560.

Extemporaneous Preparation of Sodium Benzoate.—Hager mixes 15·0 benzoic acid and 10·5 sodium-bicarbonate, and gradually adds the powder to 70·0 boiling distilled water; this solution keeps well in a stoppered bottle, and is usually neutral; if not, it can be readily rendered so by adding a little acid or sodium carbonate. After filtering sufficient water is added to make the filtrate weigh 100·0, when 5 parts solution contain 1 part crystallized sodium-benzoate, which may be readily obtained in a dry state, if desired, by evaporating the concentrated solution at a moderate temperature. Dr. Lehnebach considers the salt a reliable specific for puerperal fever and diphtheritis, and prescribes a solution of 10·0 in 150·0 water, which is given in tablespoonful doses every hour.—*Pharm. Centralb.* Aug. 7, 1879, p. 307.

Potassium Salts and their Proper Doses.—Hager agrees with Prof. Th. Husemann in the opinion that the maximum daily dose of potassium chlorate for children three years of age is 2·0 grams, for infants 1·25, and for adults 8·0 grams, and considers it the duty of every conscientious apothecary, when dispensing this and other potassium-salts, to mention the proper dose and to caution against over-doses. Potassium salts in moderate doses appear to be excellent antiphlogistic medicines, and to be poisonous in large doses.—*Pharm. Centralb.*, Aug. 14, 1879, p. 314.

The Solubility of Calcium-Oxide in Water and in Calcium-Chloride Solutions was determined by I. Post, who found it to amount to—

	At 20°C.	At 60°C.
In Water, ...	0·14	0·12
Calcium-chloride solution, spec. grav. 1·068	0·17	0·27
" " " " " 1·138	—0·04	0·36
" " " " " 1·280	—0·23	—0·93

—*Ber. d. Deutsch. Chem. Ges.*, xii. 1879, p. 1541.

Adulteration of Saffron.—A lot of saffron, having an unusually bright color and strong odor, was examined by W. Brandes, who found it to contain 50 per cent. of stems, 3 centimeters in length and about 1 millimeter in thickness, obtained from a plant belonging to the Gramineæ or Caricineæ, probably from Carex capillaris. The stems had been colored with carbonate of calcium, previously dyed with cochineal, and agglutinated by means of a sugar solution, tinted with saffron. The substituted stems were so heavy that their removal,

apparently, scarcely decreased the original bulk of the crocus.—*Pharm. Ztg.*, Aug. 16, 1879, p. 506.

Tannic acid stains are readily removed from white goods by first moistening with iron sulphate solution, and then removing the ink stains thus produced with oxalic acid in the usual manner.—*Ibid.*, Sept. 10, 1879, p. 565.

Black Ivory.—Ivory is readily and nicely dyed black by first boiling it in a strained logwood decoction, and then immersing it and allowing it to remain for a short period in a solution of sulphate or acetate of iron.—*Ibid.*, Aug. 13, 1879, p. 500.

CARICA PAPAYA L. AND PAPAYOTIN.

By Dr. Theod. Peckolt.

(Translated and condensed fr. "Ztschr. d. Allg. Oest. Apoth. Ver.," Aug. 20, 1879, p. 361 to 367, and Sept. 1, 1879, p. 373 to 380 by Louis von Cotzhausen, Ph.G.)

Carica papaya, L., the so-called melon tree, is called "Ambapaya" by the Pupi Indians and "Mamao" by the inhabitants of Brazil. The latter distinguished three kinds: 1, "*Mamao macho*" (male mamao); 2, "*Mamao femea*" (female mamao, the fruit-bearing tree), and 3, "*Mamao melao*" (melon-bearing mamao), a cultivated species of the latter. The mamao female bears yellow fruit about as large as a small pumpkin, weighing frequently more than 1 kilo, while the fruits of mamao melao are light orange-yellow, weighing 2 or 3 kilos, and frequently more. The tree, originally indigenous to America, now also grows in all portions of Tropical Africa and Asia, requires scarcely any attention and cultivation after growiug a few months, and yields crops throughout the whole year. An analysis of the ripe fruit was made, and it was found to contain fat, resin, a trace of a substance resembling caoutchouc, albumen, sugar, pectin, salts of tartaric, citric and malic acids, dextrin, extractive matter, moisture and cellular tissue. The ashes contained chlorine, carbonic-, sulphuric-, silicic- and phosphoric-acid, iron, manganese, aluminium, calcium, magnesium, potassium and sodium. The milk-juice which exists in the unripe fruit, but disappears almost entirely on ripening, was found to contain a substance resembling caoutchouc, a fatty substance resembling wax, soft resin, light-

brown resin, albumen, papayotin, extractive matter, malic acid, pectin and moisture.

Papayotin, the active principle, is best obtained without heat by precipitating it directly from an aqueous solution of the milk-juice with alcohol; it is an amorphous, snow-white powder, not hygroscopic, odorless, almost tasteless, slightly sweetish and astringent, is insoluble in ether, alcohol, chloroform, petroleum-ether, in volatile and fatty oils, but very soluble in glycerin and water.

Uses of Carica Papaya.—The ripe fruits are eaten with or without sugar, or are made into a confection or fruit butter with sugar and a little lemon juice. The unripe fruits are peeled, the seeds removed and the fruits grated and boiled with sugar to a pulp; or they are sliced and preserved with hot vinegar like pickles. A syrup is made from the expressed juice in the Province of San Paulo which is recommended as a sedative and expectorant, and is given in tablespoonful doses. The milky juice, taken internally, is said to produce inflammation of the bowels, but is given successfully in small doses as a vermifuge. An aqueous solution of it is highly recommended as a lotion for skin diseases and freckles. The seeds are also used as a vermifuge, while the leaves are utilized by the Indians who roll their meat in them, claiming that it becomes tender and acquires a pleasant taste; reduced to a paste, they are used as a cataplasm. The stems are used as pipe-stems.

THE GROWTH AND DEVELOPMENT OF CLAVICEPS PURPUREA (Tulasne).

By W. W. Stoddart, F.C.S, F.G.S., etc., Lecturer on Forensic Medicine at University College, Bristol.

Read before the British Pharmaceutical Conference.

At the end of the year 1877, a farmer residing in the neighborhood of Bristol requested me to investigate the death of some sheep, which had taken place every autumn without any assignable cause, so much so that a heavy loss was annually incurred. Many visits were consequently paid to the farm for the purpose of finding out the cause of disease. I noticed that the sheep were fed only on the natural herbage grown on the spot. It consisted of two kinds of clover, the ordinary Dutch (*Trifolium repens* L.) and the common purple (*T. pratense*, L.). With these were the ray grass (*Lolium perenne*, L.), or as it is com-

monly but erroneously spelled "rye" grass. A strict inquiry being made as to the symptoms, the farmer informed me that they were always the same, and generally supervened in the month of August, when this very peculiar illness on the farm became prevalent. It took the form of dysentery, inflammation of the bowels, diarrhœa, the evacuations resembling coffee grounds, afterwards succeeded by exhaustion, collapse and death.

Analyses of water and the soil were made for the purpose of detecting any deleterious metal or other irritant poison. No satisfactory result followed, and the cause of the illness seemed to be mysterious and inexplicable. At length I heard that the ewes sometimes slipped their young, which gave a remote suspicion that the cause of all might be due to ergotism. An inquiry was then made as to the presence of gangrene, when the unexpected but significant remark was made that, although the farm was on a dry, porous, sandy slope, yet the sheep always had the "foot-rot," even in the summer, which defied all the remedies that usually proved effectual. With this idea in my mind, and while watching the lambs feeding, I noticed that they avoided the old mature plants, while they greedily devoured the young green ones.

On examining more minutely the former, I noticed several well-formed, purplish, dark-colored ergots were projecting from the paleæ, but could not discover a single specimen on the younger fresh plants. Several of these ergots were then taken home for chemical and microscopic examination. I made a considerable number of sections, which exactly coincided with the beautiful and truthful engravings in the paper by Tulasne in the "Annales Sc. Nat." for 1853, Sur l'Ergot des Glumacées. While here, I must stop to express my admiration, both at the accuracy of these microscopic delineations and the description of the metamorphoses of this curious fungus. I thought that this would be a good opportuity of studying the growth of this vegetable, and that the result of my observations during the following year may prove to be of some service in the cause of pharmacy.

During the next few months I had only the old and nearly dead stems of the *Lolium* on which I could work, but on the 12th of April I obtained some specimens of the *Lolium perenne* in which the commencement of the inflorescence was just to be observed. Soon afterwards I made several sections of caryopsides, on which were many thousands of conidia, which seemed rapidly to multiply and to com-

pletely fill some of the grains till they protruded far beyond the glumes. In two or three days the sclerotium stage of the mycelium began to change color and assumed a purplish brown tinge. The sclerotium seemed now to have arrived at what was formerly termed the "sphacelia" condition, and was soft, while the upper portion was wrinkled. The exterior was white from the growth of the hyphæ, which seemed to grow with marvelous rapidity till at length only a small portion of the pistil remained free. Although the conidia were so numerous, I never noticed any on the andrœcium, even when examined with a one-sixth of-an-inch object glass, while close to them four or five of the caryopsides were completely filled with the little conidia, which are blunt and ellipsoid bodies about $\frac{5}{1000}$ mm. to $\frac{7}{1000}$ mm. in length, and from $\frac{3}{1000}$ mm. to $\frac{45}{10000}$ mm. in breadth. They are curved and divided into two parts, each part containing a nucleus. On touching them with a drop of diluted sulphuric acid, a cilium or minute flagellum was extruded, and when placed in water had a vibratile motion. On examining suspected flour, bread or pastry, the microscope would always show these conidia, especially with the addition of a little chromic acid.

In the third week of May several small drops of a syrupy substance made their appearance on the stem near the spikelet. If dissolved in a little distilled water and placed under the microscope, the solution would be seen to contain the conidia, and hence I suppose gave rise to the supposition that the honey-dew was intimately connected with the formation of ergot by aiding the growth of the mycelium. But it most probably only attracts and adheres to insects, who by this means convey the conidia to other spikelets and thus spread the infection to other grains. This saccharine mixture instantly reduces the copper solution of Trommer's test, thus showing the presence of sugar. When boiled, a slight milkiness is produced and not removed by nitric acid in excess, pointing out the presence of albumen. At this period the ergot attains its full development and gives no blue with iodine, because by the well-known metastatic power of fungi all starch is removed and an oil substituted. Of this oil, ergot sometimes contains about a third part of its weight.

At this period of its growth each sclerotium gives off the odor of trimethylamin when treated with potassa, and produces a red color. With spontaneous evaporation, after mixing the honey-dew with alco-

hol and a little ether, minute octahedra of mycose are formed, and may be seen with the lens.

On July 18th, I first gathered fully-formed and mature ergots, which I now produce. They have a dark exterior with a white interior, and give the ordinary red infusion.

On August 1st, one of the lambs was taken ill with the usual inflammatory symptoms. The feet also in a few days had a gangrenous appearance, which did not seem to be alleviated by any of the usual applications of silver nitrate, carbolic or cresylic acids. The affection of the feet strongly reminded me of "clavellization," so destructive among the flocks of Italy, France and Moravia, and has frequently been supposed to have been a variety of variola.

The fungus has now reached the limit of its vegetative or myceloid growth, which plainly ends at the sclerotium stage as our medicinal agent called ergot, by means of which the embryo and most of the caryopsides have been destroyed.

The hyphæ are now ready to spread in every direction and thus extend the vegetative growth, from which only we derive the peculiar medical properties of the *Claviceps* in their greatest intensity and power on the animal economy, and it is now that the greatest effects are produced which are included under the name of "ergotism."

A *post mortem* examination of the sheep showed the presence of the conidia among the "coffee ground" looking fæces. The fungus having now arrived at this stage awaits for appropriate weather and other suitable conditions for the fructifying metamorphosis.

At the end of August one or two of the ergots that had fallen with the stems of the grass on the damp ground I placed, for more convenient observations, on the moist soil of a flower pot. In a few days I noticed on the dark cuticle of the sclerotium several minute excrescences from which gradually emanated some stalks about 11 to 18 millimeters in length, each supporting a minute round head about 4 millimeters in diameter, in fact furnishing good characteristic specimens of *Claviceps purpurea*.

It is not to be wondered at that these fungi should have received the names of sphœria or torrubia, because they so much resemble the growth so often described as being found on the heads of caterpillars or larvæ, and used as a medicine in China and Japan.

A very remarkable change now took place in the oil that was so

noticeable as long as the condition of sclerotium continued, but directly the mature *Claviceps* appeared the oil oxidized, dried up and was found no longer. The round heads of the fungus now became covered with a large number of brown dots, which eventually became the openings of pear-shaped sacs or asci of the perithecium. If a section was made with a sharp scalpel each ascus was seen to be filled with a glutinous substance containing seven or eight spores. These last adhered to the ergot, looking like a powdery coating and causing the production of many thousands of conidia on each ergot and ready for the evolution of fresh mycelium.

This seems to me the true mode of development of *Claviceps*. It commences and proceeds with the vegetative growth till it reaches the sclerotium stage and at that period possesses in the greatest vigor the medicinal characteristics of ergot.

I have, I think, conclusively found that ergot has the greatest medicinal power in the month of August, and that the experience of six or seven years shows that the same changes take place in the plant at the same period of every year.

It has been known to medical men that the so-called essences of ergot are so uncertain in their efficacy that many, in order to ensure success, have determined to use the powder itself. Dr. Kluge, of Berlin, observed some years since, that for some reason or other the properties of ergot varied according to whether it was gathered *before or after the harvest*. In the former case it had an energetic action, while in the latter it was frequently powerless.

The sheep were distinctly seen to choose the young green grasses and to particularly avoid the older and ripe ones, probably directed by the odor of trimethylamin, for I found that I could not produce this odor till the sclerotium was fully developed and the starch completely gone.

I therefore think the following conclusions may be safely drawn:

1. That for all medical purposes, or pharmaceutical preparations, ergot ought to be gathered in the months of August or September.

2. That ergot always attains its greatest intensity at the end of the vegetative period.

3. That the medicinal powers of ergot diminish or disappear as soon as the fructifying period commences.

I have chemically and microscopically examined the ergots produced

from the *Lolium perenne* while the plants have been living. The infusion was first treated by the ether process of Stas. On the evaporation of the ether an oily residue was obtained containing a minute quantity of a resinous substance. The extract was then dissolved in alcohol, afterwards mixed with water and filtered. Chloriodide of mercury caused a precipitate reminding one of a vegetable alkaloid.

I did not detect any crystals of cholesterin that are said to exist in *Secale cornutum*, but phosphoric acid was clearly shown by using molybdate of ammonia and nitric acid.

In toxicological investigations the microscope is the most to be depended upon. The conidia are very abundant and may always be detected in bread, pastry or flour, especially if acetic or chromic acids be used to make their presence more evident. The one-sixth or one-eighth of an inch is a sufficiently high power. I always find that this mode of detection is preferable to the use of potassa and distillation alone. The little conidia may be generally observed in the intestinal canal of a poisoned person or animal.—*Phar. Jour. and Trans.*, Sept. 6, 1879, p. 194.

VARIETIES.

Salve for Burns, Scalds, etc.—Dr. Brown recommends a salve consisting of 8 grams iodoform, 3 to 5 grams extract of conium, 10 drops carbolic acid and 30 grams cold cream, which is spread on lint and is applied to the wounds twice daily. —*Pharm. Ztschr. f. Russl.*, July 15, 1879, p. 432, from *Aerztl. Int. Bl.*

Improvement in Matches.—Sudheim and Thoppen manufacture matches which, they claim, are neither poisonous nor dangerous, and ignite when rubbed on any surface, but never spontaneously. They are made by first dipping the wood into a mixture prepared by triturating together, with the addition of a little water, 6 parts potassium chlorate and 3 parts plastic clay (aluminium silicate), and when well mixed adding 2 parts red lead, some glue solution ($\frac{3}{4}$ to 1 part glue), 3 parts powdered glass, and finally 1 part red phosphorus; when dry the half-finished matches are dipped into a mixture of 2 parts sandarac, 10 parts stearin and 1 part naphthalin, prepared by melting together the sandarac and stearin and adding the naphthalin when almost cool.—*Apoth. Ztg.*, Aug. 2, 1879, p. 127, from *Ind. Bl.*

Comparative Antiseptic Efficacy of Various Acids and their Salts.—N. Sieber's researches prove, that the presence of 0·5 per cent. acid is usually sufficient to prevent decay. The mineral acids rank first in regard to their antiseptic

strength, phenol coming next, which is followed by butyric, then lactic, and finally boracic acid; the latter is so weak that 4 per cent. is often not sufficient to prevent decay of pancreas—the latter always decays sooner than meat. *Mould vegetation* is not prevented by 0·5 per cent. sulphuric, 1 per cent. phosphoric, and 2 or even 4 per cent. lactic acid.

Dr. G. Glaser claims that aluminium acetate is fully as efficient an antiseptic as acetic acid, which induces Stein to believe that soluble acid salts possess almost as strong antiseptic properties as the acids.—*Schw. Wochenschr. f. Pharm.*, Aug. 8, 1879, p. 281, from *Journ. f. Pract. Chem.*

Good transparent glycerin soap is made by melting together 10 kilograms tallow, 10 kilograms cocoa oil, 6 kilograms castor oil and 10 kilograms glycerin, heating to 60 or 65°R., adding 13 kilograms soda lye (40 per cent.) and 12 kilograms 96 per cent. alcohol, and stirring the mixture until the soap becomes transparent, when a sugar solution (2 kilograms sugar boiled with one-half kilogram water), 100 grams cassia oil and 50 grams bergamot oil are added, and the finished soap is poured into tin moulds.—*Pharm. Ztschr. f. Russl.*, July 15, 1879, p. 440, from *Ap. Ztg.*

Mouldy and unclean barrels can be readily cleaned by first rinsing them with water containg soda, then filling them with water, acidulated slightly with hydrochloric acid, allowing them to stand two days, emptying them and finally rinsing with clean water.—*Ibid.*, p. 441, from *Drog. Ztg.*

Rust is readily removed from white goods by soaking the stains in a weak solution of tin chloride, and rinsing immediately with much water; the tin salt is more reliable in removing iron rust, and quicker in its action than oxalic acid, unless the stains are soaked in a solution of the latter, contained in a tin spoon, when the stains disappear in a shorter time.—*Pharm. Centralbl.*, July 17, 1879, p. 288, from *Schw. Gew. Bl.*

Extractum Cinchonæ Fluidum and Solidum.—Prof. Husemann approves of Dr. De Vrij's method of making these preparations, which consists in triturating the finely-powdered bark of cinchona succirubra indica into a thin paste with cold water adding sufficient normal hydrochloric acid (20 cc. to 3·2 grams total alkaloids contained in the bark), allowing to stand for at least 12 hours, stirring occasionally, transferring to a percolator, collecting the percolate as soon as it drops clear and as long as it is rendered cloudy by caustic ammonia, and concentrating on a water-bath until 1 ounce of the fluid extract represents 1 ounce of bark. The solid extract is obtained by continuing to evaporate to the consistence of a soft pill mass, 42 per cent. of which were obtained as a yield by Nanning. Husemann claims that this extract is preferable to the alcoholic, which also contains all efficacious constituents of East India cinchona, but besides substances like cinchocerin, which render it partially insoluble in water.—*Ztschr. d. Allg. Oest. Ap. Ver.*, July 20, 1879, p. 321, from *Pharm. Ztg.*

Cinchona Cultivation in Java.—Dr. Hasskarl reports that continual rain greatly assisted the growth of the cinchona plants during the last three months, but greatly interfered with the collection of bark. The number of trees in the different plantations increased to the extent of 88,634 trees; the number of trees standing in the open air decreased 5,834; that of those in hot-beds and hot-houses increased 94,468. There is an increase of 471 in the number of young trees of C. Calisaya, Ledgeriana and C. Hasskarliana, and of 9,300 in the number of trees of C. succirubra, C. caloptera, while C. officinalis decreased 15,105, and C. lancifolia 600. The whole number of trees, including the 429,618 plants in the hot-beds, is 2,461,326. —*Pharm. Handelsbl.*, June 18, 1879, p. 26.

Preparation of Sago.—The sago-palm, Metroxylon sagus, yields the principal food of the inhabitants of the islands stretching along the western coast of Sumatra, who obtain the sago as follows: The trees having been sawed into pieces four to five feet in length, each piece is split into four parts, which, after the bark has been removed, are placed in a shady place until dry, when the pith is rasped into a coarse meal, transferred to a coarse cotton strainer, suspended over a wooden trough, and kneaded into a smooth, thin paste with water; this kneading is continued as long as the milky liquid saturated with starch runs from the strainer. The contents of the trough are then allowed to settle, the supernatant water is removed, and the white sediment dried in the air.—*Ztschr. d. Allg. Oest. Apoth. Ver.*, June 1, 1879, p. 248, from *Rosenberg's The Malay Archip.*

MINUTES OF THE COLLEGE.

PHILADELPHIA, September 29th, 1879,

The semi-annual meeting of the Philadelphia College of Pharmacy was held this day at the College, Dillwyn Parrish, President, in the chair; twenty-one members in attendance.

The minutes of the last stated meeting were read, and, on motion, approved.

The minutes of the Board of Trustees for the previous three months were read by Mr. C. Bakes, and, on motion, adopted.

Charles W. Hancock, chairman of the delegation to attend the annual meeting of the American Pharmaceutical Association, read an interesting report, giving an account of the trip of the delegation, and of some of the important matters which claimed the attention of the Association.

On motion, the report was referred to the Committee on Publication.

Prof. Remington spoke of the meeting as a satisfactory one, and alluded to the

fact of a larger delegation being present from Philadelphia than from any other place excepting the city of Indianapolis.

Prof. Remington, on behalf of the delegation to attend the convention of teaching colleges, reported that no definite action was taken relative to the subjects which had been proposed by the meeting at Atlanta last year, in consequence of some of the colleges not being ready to act.

A letter from U. S. Commissioner R. C. McCormick was read stating that he had sent the College, by Express, the silver medal which had been awarded by the International Jury of the Universal Exposition of 1878, held at Paris, for their exhibit. Accompanying the letter was a certificate from the officers of the exhibition announcing that the jury had decreed the medal.

Prof. Remington moved that the Actuary take measures to have the certificate properly framed and exposed to view in the museum of the College, and that the medal, when received, be properly taken care of, which motion was adopted.

The President ordered an election for three Trustees, and a committee of three on Deceased Members; this being the time for such action. Chas. W. Hancock and Chas. A. Weidemann, acting as tellers, reported the following gentlemen elected, viz.:

BOARD OF TBUSTEES.

For three years:—William C. Bakes,
Edward C. Jones,
Dr. Wilson H. Pile.

COMMITTEE ON DECEASED MEMBERS.

Charles Bullock, Alfred B. Taylor, Joseph P. Remington.

No further business claiming the attention of the meeting, then, on motion, adjourned.

WILLIAM J. JENKS, *Secretary.*

MINUTES OF THE PHARMACEUTICAL MEETING.

OCTOBER 21st, 1879.

Dillwyn Parrish, President of the College, called the meeting to order. It being the first of this series, the election of a Registrar was the first business that claimed attention, and, on motion, Thos. S. Wiegand was duly elected.

The minutes of the May meeting were read and approved.

Mr. John Moss, of London, England, was introduced to the meeting and welcomed by the chairman, as was also Prof. C. Lewis Diehl, of the Louisville College of Pharmacy.

The Registrar laid upon the table the report of the Commissioner of Education, and also the report of the Botany of the Geographical Survey west of the 100th meridian, made by Capt. G. M. Wheeler, of Engineer Corps, U.S.A.

Prof. Maisch presented a report upon the Botanical Classification of the Cinchonas by Prof. Otto Kuntze, illustrated by photographs.

An essay by Mr. N. P. Hamberg, of Stockholm, Sweden, an honorary member of our College, was presented by Prof. Maisch on his behalf.

A copy of the second edition of the "National Dispensatory," by Stillé and Maisch, was also presented by Prof. Maisch, for which the thanks of the meeting were returned.

Prof. Maisch read a paper written by Mr. Chas. J. Biddle, Ph.G., detailing his experiments made with the rhizome of podophyllum peltatum. The paper (see page 543) exhibited considerable pains in the investigations, but leaves the question as to the presence of an alkaloid to be settled by further experiments, which the author hopes to prosecute in the coming season; it was on motion referred to the Committee on Publication.

Prof. Remington read a paper written by Mr. L. E. Sayre upon *glyceritum ferri subsulphatis*; this was also similarly referred (see page 551).

Prof. Sadtler presented a specimen of the cone, the oleoresin, the distillate therefrom and the leaves of the *Pinus sabiniana*, and alluded to their history in a succint manner, pointing out the singular fact that the distillate was nearly if not quite identical with the paraffin heptane.

Prof. Remington exhibited a specimen of flaxseed meal, which was infested with acarus sacchari, or sugar itch insect. The development of the insect from the egg to its full-grown condition was shown very clearly by well-executed drawings of a large size, which the Professor used in explaining the subject to the class during lecture season. It was thought by several members that the most probable manner in which the contamination occurred was by the use of old sugar barrels for packing the flaxseed meal.

It was suggested that those members who prepare papers or intend bringing subjects forward for discussion at the meetings be requested to inform the Registrar of the subjects before the notices are issued, so that he may include that information in the invitation.

Prof. Maisch promised to have a paper ready for the next meeting upon certain American drugs which are sold under incorrect names.

On motion adjourned.

THOS. S. WIEGAND, *Registrar.*

PHARMACEUTICAL COLLEGES AND ASSOCIATIONS.

American Pharmaceutical Association.—In the last number of the "Journal" we have given an account of the transactions of this body at its regular sittings. When a meeting is held in one of the large cities, like Boston, New York or Philadelphia, a large attendance may be expected on account of the large number of members residing in and near these cities. The meeting in 1875 had the additional attraction of a visit to the White Mountains, and that of 1876 secured an unusually large attendance in consequence of the Centennial Exposition. But with the excep-

tion of these two meetings, at Boston and Philadelphia, there has not been a number of members present, during the past seven year, equal to that at Indianapolis, where 126 were registered, the same as at Cleveland in 1872. The favorable position of Indianapolis as a railroad centre, and the activity displayed by the Local Secretary and Local Committee, were instrumental in securing this result. The cause first mentioned, however, operated likewise against the concentration of the visitors from the different sections of the country upon any one of the routes of travel; still a goodly number of members, with their ladies, met upon the train of the Pennsylvania Railroad, which reached Pittsburg near midnight, September 6th, and mostly stopped here over Sunday at the Seventh Avenue Hotel, embracing the opportunity of taking a view of the surroundings of the iron city. On the following Monday the party was joined on the route to Indianapolis by other members, and arrived near midnight, greeted at the depot by a committee of the local members and by visiting members from other sections of the country, and proceeded to their quarters at the Grand Hotel. During the same night and on the following morning most of the other visitors arrived.

On the evening of September 9th the Microscopical Society of Indianapolis held an informal levee at the Grand Hotel, under direction of Dr. Hubbard. Many instruments, of different makers, were placed on the tables, and the objects shown attracted the interest of all. At the same time an opportunity was afforded for the visitors to become acquainted with resident members and their ladies. On Wednesday evening Mænnerchor Hall was crowded with an appreciative audience, listening to a concert given by the Mænnerchor Vocal Society and Beissenherz's Military Band. On Thursday evening many availed themselves of the invitation extended for witnessing the performance of the comic opera "Fatinitza," while others participated in the dancing arranged at the headquarters until the time arrived for the banquet tendered by the druggists of Indianapolis. Toasts were proposed and responded to, and the hop was afterwards again indulged in.

The invitations received for visiting public institutions and private establishments were so numerous that it was impossible, during the short stay allotted to most of the visitors, to attend to all. But the visiting ladies were shown the courtesies of seeing as much as possible, and, after the final adjournment of the Association, the busy members were conducted to several industrial establishments where new and old processes could be seen in operation.

On leaving the city of Indianapolis the members scattered over the numerous roads leading away, those from the Atlantic States very generally extending their trip to Cincinnati, St. Louis or Chicago, and a number of them returning home by way of Niagara Falls, where their fellow-member H. E. Griffith was untiring in pointing out the beauties of this famous locality.

The exhibition of articles of pharmaceutical interest was arranged in a large, well-lighted and ventilated room of the Masonic Hall, admirably adapted for the purpose by its size and its close proximity to the meeting-room; proprietary and copyrighted preparations had been rigidly excluded under the by-law adopted a year ago, and it was evident that the attractiveness of the exhibition had thereby not suffered in the least; in fact, with the exception of the splendid exhibit at Boston

in 1875, it was the most extensive and best displayed collection that had been shown at the meetings for some years past. For an enumeration of the articles exhibited we have to refer to the "Proceedings," which will doubtless contain a detailed report; but in this place we desire to call special attention only to a few of the exhibits which appeared to us to be particularly noteworthy. That Powers & Weightman, Rosengarten & Sons and Mallinckrodt & Co., displayed in the chemical department, was to be expected, and this made the absence of other firms more noteworthy. Among the collections of crude drugs, those of J. G. Steele & Co. (chiefly California and Asiatic drugs), Lehn & Fink (including numerous alkaloids and other proximate principles), McKesson & Robbins (including curious South American implements and products collected by Mr. Wellcome), Merrill, Thorp and Lloyd (including new salts of berberina), Rob. Shoemaker & Co. (chiefly powdered drugs), B. O. & C. G. Wilson (pressed herbs), Parke, Davis & Co. and others were quite attractive, many of the specimens being either novel or particularly handsome in appearance. Numerous pharmaceutical preparations, such as fluid extracts, elixirs, lozenges, pills (sugar-coated, gelatin-coated and compressed), plasters, suppositories, etc., were exhibited; also mineral waters, glass-ware, pill and powder boxes, stills, Trœmner's balances, druggists' sundries, etc.

New Hampshire Pharmaceutical Association.—The sixth annual meeting was held in the Haseltine House, Manchester, October 9th, Dr. Chas. A. Tufts acting as President *pro tem.* The following officers were elected: Brackett B. Weeks, Manchester, President; Austin E. Wallace, Nashua, John A. Wiley, Manchester, Vice Presidents; George F. Underhill, Concord, Secretary; A. B. Foster, Concord, Treasurer; Robert C. Dickey, Hillsborough, Auditor; Charles S. Eastman, Concord, Reporter on Progress of Pharmacy. Various standing committees were also elected, and delegates to the meeting of the American Pharmaceutical Association in 1880. A lecture on pharmaceutical topics was delivered by Prof. P. W. Bedford, and the Association adjourned to meet at Nashua on the second Tuesday in October, 1880.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

Winter and its Dangers. By Hamilton Osgood, M.D., editorial staff of the Boston "Medical and Surgical Journal." Philadelphia: Lindsay & Blakiston, 1879. 16mo, pp. 160. Price, 50 cents.

This little volume, one of the "American Health Primers," makes its appearance at a season when it will be read with particular interest, and its suggestions may be practically carried out. The following are the headings of the different chapters: General considerations; Dangers arising from error in dress; Carelessness and ignorance in bathing; Inattention to pulmonary food; Danger from overheated air; Indifference to sunshine; Sedentary life and neglect of exercise; Dangers of school-life in winter; Winter amusements; Closing considerations.

First Book in Qualitative Chemistry. By Albert B. Prescott, Professor of Applied Chemistry in the University of Michigan, etc. New York: D. Van Nostrand, 1879. 12mo, pp. 160.

A work on chemical analysis, having for its author a teacher of the experience of Prof. Prescott, cannot fail to attract attention, and the book before us merits it. We are informed in the preface that this little manual has been prepared for certain classes who take a short course in qualitative chemical work to attain some practical acquaintance with the materials of everyday life, rather than to qualify as analysts. The scope of the work includes a more definite study of chemical characteristics than is provided in the common rudimentary qualitative analysis. The work will be found useful and convenient by teachers in the instruction of students who have but a limited time to devote to the subject, and as a preliminary guide to the use of larger works on mineral analysis.

The Multum in Parvo Reference and Dose Book. By C. Henry Leonard, M.A., M.D. Detroit, 1879. pp. 100.

Doses, pronunciation, incompatibles, poisons and antidotes, testing urinary deposits, and other subjects of interest to the physician, are briefly treated. In the dose list the officinal articles and unofficinal drugs are enumerated, together with all sorts of specialties, the strength and composition of which remain the secret of their inventors and manufacturers—in our opinion a weighty objection to a book intended for reference by the physician.

A Compendium of the most Important Drugs, with their Doses, According to the Metric System. By Wm. F. Whitney, M.D., and J. H. Clark, Apothecary to the Boston Dispensary. Boston: A. Williams & Co., 1879. Price, 25 cents.

This little pamphlet is full of typographical errors; for instance, hydrargyrum is spelled hydrag. thirteen times in succession. The doses, as far as examined, appear to be correct.

Report of the Committee on Coinage, Weights and Measures. Part I. On the adoption of the metric system of weights and measures, together with documents and statistics relating to the subject. Part II. On metric coinage. Washington: Government Printing Office, 1879. 8vo, pp. 218.

The Metric System. By J. T. Baldwin, M.D., Professor of Anatomy Columbus Medical College. 8vo, pp. 11.

The first of these two documents is an elaborate official report *in favor* of the adoption of the metric system. The second embraces remarks made by Dr. Baldwin before the Ohio State Medical Society *in opposition* to the introduction of the metric system. The dire consequences depicted by Dr. Baldwin as resulting from the general adoption of this system have been avoided by the nations that are now using it, and we have no doubt would not prove as formidable an obstacle in the United States as the author believes. But we decidedly object to his assertion of there being *three* metric systems proposed for use in medicine. It is true that propo-

sitions have been made looking towards the entire or partial abandonment of the use of measures of capacity in medicine; but it should be remembered that at the present time prescriptions written in the United States by physicians educated in Europe are almost invariably written in weights alone, as is customary on the continent of Europe, in South America and in Mexico, in fact, we believe, in all countries except those inhabited or governed by English speaking nations, who direct most liquids by *measure*. The adoption of the metric system would evidently not prevent a physician from prescribing liquids by volume instead of by weight, but the latter course would be preferable as being the most correct one, and the one followed by most nations. One of the strongest arguments in favor of a change is ignored or overlooked by Dr. Baldwin, namely, the fact that the measures and weights of the British Pharmacopœia differ from those in use in this country, and he is by no means correct in asserting that the English and American books use the "old system;" nor do we subscribe to his assertion advanced as a truism, that "decimals are advantageous in large transactions, but are unnatural in small ones."

Untersuchungen aus dem Pharmaceutischen Institut der Universität Dorpat. Mitgetheilt von Dragendorff.

Investigations from the Pharmaceutical Institute of the University of Dorpat; communicated by Prof. Dragendorff.

The pamphlets contain investigations on the composition of the seeds and roots of Pæonia peregrina; on mannit as a secondary product in the preparation of lactic acid from cane sugar; on the origin of resins and the chemistry of volatile oils.

Untersuchung der chrysophansäureartigen Substanz der Sennesblätter und der Frangulinsäure. Inaugural-Dissertation von E. von Keussler, Dorpat.

Investigation of the compound from senna leaves resembling chrysophanic acid and of frangulic acid.

The author succeeded in preparing the compound named in a pure state and in proving its identity with chrysophanic acid from rhubarb, with which frangulic acid is not identical.

Das Verhalten von Harnbacterien gegen einige Antiseptica. Inaugural-Dissertation von Theodor Haberkorn, Dorpat.

The behavior of bacteria in urine to several entiseptics.

The development of bacteria in urine is best prevented by corrosive sublimate, one part being sufficient for 25,000 parts of urine. To produce the same effect larger quantities of thymol, volatile oil of mustard, creasot, benzoic acid, carvol and carbolic acid are required in the order named.

Ueber den Japantalg (On Japan-wax). Von Arthur Meyer.

This is a very creditable, critical review of the literature on this subject, and an account of experiments performed by the author, and of information received from Prof. Rein. The pamphlet contains two wood cuts and three litographic plates of Rhus succedanea, D. C., its fruit and of various tissues of the latter.

Note sur certains Médicaments Végétaux Américains et sur leur Formes Pharmaceutiques. Par Charles Rice, Anvers, 1879, pp. 13.

Note on certain American vegetable medicaments and their pharmaceutical preparations.

The paper was written as a reply to a letter of the Antwerp Pharmaceutical Society, addressed to the New York College of Pharmacy, and treats of Alnus rubra, Prunus virginiana, Frasera Walteri, Gelsemium sempervirens, Hamamelis virginica and other American drugs and their preparations.

On the Connection of the Hepatic Functions with Uterine Hyperæmias, Fluxious, Congestions and Inflammations. By L. F. Warner, M.D., Boston, Mass., 1879, pp. 37.

This is a reprint from the Transactions of the American Medical Association for 1878, and contains in an appendix the views on the same and kindred subjects of a number of prominent physicians.

The National Dispensatory Containing the Natural History, Chemistry, Pharmacy Action and Uses of Medicines Recognized in the Pharmacopœias of the United States, Great Britain and Germany, with Numerous References to the French Codex. By Alfred Stillé, M.D. and John M. Maisch, Phar.D. Second edition thoroughly revised with numerous additions. With two hundred and thirty-nine illustrations. Philadelphia: Henry C. Lea, 1879.

Scarcely six months have passed since we had occasion to comment in these columns upon the appearance of the National Dispensatory, and already we find ourselves surprised by the publication of a second edition, as the authors justly remark, "revised in a manner to render the volume more worthy of the very marked favor with which the book has been received." This evidence of success, seldom paralleled, shows clearly how well the authors have met the existing needs of the pharmaceutical and medical professions. Gratifying as it must be to them, they have embraced the opportunity offered for a thorough revision of the whole work, striving to embrace within it all that might have been omitted in the former edition, and all that has newly appeared of sufficient importance during the time of its collaboration, and the short interval elapsed since the previous publication.

There is no field within the vast extent of chemical research wherein has been displayed of late greater activity than in the investigation of the organic constituents of the almost innumerable products of the vegetable kingdom. The zeal of scientific investigators, busy at work to-day in all zones of our globe, combined with the ever-increasing facilities of commercial intercourse, bring constantly to light new plants, whose productions invite the attention of the chemists. New proximate principles are constantly recognized in their researches, many of them exhibiting properties which, in their peculiar action upon the animal organism, engage the labors of the physiologist, whose results at once point out the range of their application in the hands of the practitioner for the relief of suffering humanity. It is from this field the authors gathered the most important of the new additions to their work. How well they have collected therefrom is shown, *e. g.*, by the article Duboisia, which we find under a separate heading; by that of Cotobark, placed as an allied drug under Nectandra, and by the account of the constituents of the several species

of Thevetia and of Geissospermum, under the heading Oleander. Drosera, Laminaria, Gynocardia, or Chaulmugra-seed, and Passiflora, appear under separate articles and at their respective places as allied drugs, amongst others of more or less note, Rhamnus Purshiana. Of chemicals, a number of quinia salts are added, together with their mode of preparation and salient properties. The extended notice of thymol, under Oleum Thymi, will be received with much interest, as this powerful antiseptic is coming daily more into use. Amongst pharmaceuticals we notice, under the separate heading of Elixiria, the formulas of the leading preparations of that class as adopted by the American Pharmaceutical Association; also, all the articles of the German Pharmacopœia have been introduced which were not noticed before, as well as many others from the French Codex. The Index has been largely swelled by references, partly omitted in the first edition, and the greatest part new, including many synonyms called for by changes in nomenclature and names in different foreign languages. The number of illustrations has been increased by nearly forty new wood-cuts, the larger part of them attached to the descriptions of drugs derived from our indigenous plants, serving as most appropriate aids to their identification.

After having gone carefully through the volume, we must admit that the authors have labored faithfully, and with success, in maintaining the high character of their work as a compendium meeting the requirements of the day, to which one can safely turn in quest of the latest information concerning everything worthy of notice in connection with Pharmacy, Materia Medica and Therapeutics.

CHAS MOHR.

Mobile, Ala., October, 1879.

OBITUARY.

FREDERICK MOHR, Ph.D., M.D.—After an illness of four days, commencing with pneumonia, the earthly career of a man was terminated at Bonn, Germany, September 28th, whose numerous contributions to pharmacy, chemistry, geology and other branches of the natural sciences have placed him in the foremost ranks of scientific investigators. Charles Frederick Mohr was born at Coblence November 4th, 1806, and, after having received a thorough preliminary education, became an apprentice in pharmacy in the store of his father. In 1828, he went to the University of Heidelberg, where he applied himself to the study of natural sciences, and more particularly of chemistry under Gmelin's guidance, and afterwards graduated as Doctor of Philosophy. He subsequently studied at the Universities of Bonn and Berlin, married in 1833, became the successor of his father on the death of the latter in 1840, and more recently accepted the professorship of Pharmaceutical Chemistry at the University of Bonn, in which position he was active until the time of his death.

His first literary production dates from the year 1837, when he published an essay on the nature of caloric and the conservation of force, the views then advanced by him being now generally adopted. In the same year he accepted the task of completing the Pharmacopœa Universalis, projected by P. L. Geiger, who died in Janu-

ary, 1836, shortly after the publication of the first part of that work, containing the simple drugs and the chemicals manufactured on a large scale. The second part by Mohr was published in 1845, and contained the formulary of galenical and chemical preparations of the various pharmacopœias and dispensatories in use during the preceding seventy or eighty years, and including of American works the United States Pharmacopœias of 1820 and 1830, Coxe's American Dispensatory and Ellis' Formulary. This was quickly followed, in 1846, by his "Pharmaceutische Technik," which was translated into the English language by Professor Redwood, and edited for the use of American pharmacists by Professor Procter in 1848, under the title of "Practical Pharmacy." About the same time Mohr wrote his commentary on the Prussian Pharmacopœia, the first volume of which appeared in 1847, a work characterized by critical analysis of the statements and processes of the pharmacopœia. A smaller volume on the dispensing of medicines (Receptirkunst), which, however, is mainly intended for the use of physicians, completes (1854) the list of his separate pharmaceutical works.

But his numerous contributions to the pharmaceutical journals of Germany were also of great importance, and embraced processes as well as manipulations and apparatus, such as extracts, bitter almond water, benzoic acid, morphia, filters, cork-borers, specific gravity balances, smelting furnaces, Marsh's apparatus, and many other subjects. Many of the apparatus and processes invented or perfected by him have been pretty generally adopted throughout the civilized world, and this is more particularly the case with the numerous apparatus, contrivances and processes worked out by him in the department of volumetric analysis, which had been introduced by Gay-Lussac, Marguerite and others, but was brought through Mohr to such a state of perfection that it has, in a great measure, taken the place of the gravimetric methods. His work on measure-analysis (Titrirmethode) made its first appearance in 1853; since then four revised and enlarged editions have been published, and to the present time it is regarded as the standard work in this particular branch.

It was, however, not only the practical and analytical department of chemistry that received his attention, but likewise the theory of the science. Aside from the many essays contributed to journals, and aside from the work on measure analysis, his most important work on theoretical chemistry is that on the "mechanical theory of chemical affinity," which appeared in 1868.

Since about 1857 Mohr devoted much of his time to geological investigations, and already, in 1866, appeared from his fruitful pen a "history of the earth," in which he embodied novel views on the origin of coal, the deposition of lime in the sea through the agency of plants, the occurrence of magnetic iron in basalt, and of metallic iron in meteorites, etc.

Mohr's works are characterized by clearness, comprehensiveness and attractiveness. His learning was duly appreciated by scientists, and he was a member of many learned societies. By his death the Philadelphia College of Pharmacy loses one of its valued honorary members. It seems strange to us that a man of his general scientific and special pharmaceutical knowledge and learning was never selected as a member of the commissions entrusted with the various revisions of the pharmacopœia of his native country.